REMARKS

Claims 1-18 are currently pending in the above-identified patent application.

In the subject Office Action, claims 2, 8–13, and 15 were rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention since the Examiner stated that the term “approximately” in claims 2, 10, and 15 is a relative term which renders the claims indefinite, is not defined by the claims, the specification does not provide a standard for ascertaining the requisite degree, and one of ordinary skill in the art would not be reasonably apprised of the scope of the invention. Applicant wishes to thank the Examiner for having pointed out this error, and has deleted the term “approximately” from claims 2, 10 and 15. No new matter has been added by this change since “the number of said plurality of parallel data streams” can only be an integer.

Claim 8 was rejected since the Examiner asserted that this claim recites the limitation “said first data stream” in line 5, and that there is insufficient antecedent basis for this limitation in the claim. Applicant wishes to thank the Examiner for having identified this mistake, and has amended claim 8 by deleting reference to “said first data stream.” No new matter has been added by this change.

Claim 9 was rejected since the Examiner stated that this claim recites the limitation “a second throughput” in line 9, and that there is insufficient antecedent basis for this limitation in the claim. The Examiner continued that it is not clear if the limitation is referring to the “second throughput” recited earlier in the claim or a new “second throughput.” Applicant again thanks the Examiner for having brought this obvious typographical error to applicant’s attention, and wishes to point out that each of the plurality of parallel data streams has the first throughput in order that it may be properly transmitted to its corresponding disk drive. No new matter has been added by this amendment since support therefor may be located in lines 13-18 of page 5 of the Specification, as originally filed.

The Examiner next rejected claims 1–18, under 35 U.S.C. 102(b) as being anticipated by U.S. Patent No. 5,724,539 to Riggle et al., hereinafter Riggle, since the Examiner stated that as per claim 1, Riggle teaches a method comprising addressing a plurality of data strips from data to a chosen disk of a plurality of disk drives (Col. 3, lines 6–10 and Col. 6, lines 28–31); forming a data stream comprising data strips (FIG. 1, Item 90), the data stream having a first throughput (Col. 5, lines 5–8 and 13–17); creating a plurality of parallel data streamers (FIG. 1, Item 110), each of the plurality of parallel data streams having a second throughput (Col. 5, lines 5–8 and 13–17), the second throughput being smaller than the first throughput (Col. 5, lines 5–8 and 13–17); directing the plurality of parallel data streams to a corresponding plurality of the plurality of disk drives (FIG. 1, Item 150 and Col. 6, lines 28–31) such that each data strip in the plurality of data strips is transmitted to the chosen disk of the plurality of disk drives (Col. 6, lines 31–34); and storing each of the data strips on the each of plurality of disk drives (Col.6, lines 31–34).

As per claims 2, 10, and 15, the Examiner continued that Riggle also teaches wherein the plurality of parallel data streams is equal to the first throughput divided by the second throughput (Col. 5, lines 5–8 and lines 13–17); as per claims 3, 11, and 16, Riggle teaches wherein the number of the plurality of parallel data streams is 2 (FIG. 1 Item, 150 [DDK could be any number, including 2]); as per claims 4, 12, and 17, Riggle teaches wherein the number of the plurality of parallel data streams is 4 (FIG. 1, Item, 150 [DDK could be any number, including 4], Col. 11, lines 50–54); as per claims 5, 13, and 18, Riggle teaches wherein at least one of the data strips comprises parity information (Col. 6, lines 52–65); as per claim 6, Riggle teaches wherein the creating a plurality of parallel data streams is performed by a first-in-first-out (FIFO) buffer (Figure 1, Item 120); as per claims 7, Riggle teaches wherein the directing of the plurality of parallel data streams is performed by a crossbar switch (FIG. 1, Item 100 and Col. 6, lines 28–31); and as per claim 8, Riggle teaches reading each of the data strips from the plurality of disk drives (Col. 2, line 66–Col. 3, line 5), transmitting

each of the data strips from the plurality of disk drives in the plurality of parallel data streams (Col. 2, line 66–Col. 3, line 5).

As per claims 9 and 14, the Examiner asserted that Riggle teaches a system comprising a plurality of disk drives (FIG. 1, Item 150) each having a communication channel (FIG. 1, Item 140) capable of communicating at a first throughput (Col. 5, lines 5–8 and 13–17); a controller (FIG. 1, Item 40) adapted to address a plurality of data strips from the data to a chosen disk of the plurality of disk drives (Col. 3, lines 6–10, Col. 6, lines 28–31), and form a data stream comprising the data strips, the data stream having a second throughput (Col. 5, lines 5–8 and 13–17); a buffered switch (FIG. 1, Item 50) in communication with the controller adapted to create a plurality of parallel data streams (Col.6, lines 28–31), each of the plurality of parallel data streams having the second throughput, the first throughput being smaller than the second throughput (Col. 5, lines 5–8 and 13–17); a crossbar switch (FIG. 1, Item 100) in communication with the buffered switch and adapted to direct the plurality of parallel data stream to the plurality of disk drives such that each of the separate data strips are transmitted to each of the plurality of disk drives to which the separate data strips are addressed (Col. 6, lines 31–40); and wherein the plurality of disk drives are adapted to receive the plurality of parallel data streams and store the data strips on the disk drives (Col. 6, lines 31–34).

Applicant respectfully disagrees with the Examiner concerning the rejection of claims 1–18, under 35 U.S.C. 102(b) as being anticipated by U.S. Patent No. 5,724,539, for the reasons to be set forth hereinbelow.

Briefly, the present invention describes and claims storing data such that a data stream is buffered and split into two or more slower data streams that are switched to two or more data storage devices capable of receiving data at the slower rate. A controller directs stripes of data that are broken into data strips, to individual disk drives. The data strips enter a FIFO buffer at a first speed, and two or more nearly simultaneous data streams are created at a second, slower speed, each data stream containing the specific strips destined for the specific disk drives. The data streams are then switched to the specific disk drives for

writing onto the storage media. As an example, claim 1 recites in part: "addressing a plurality of data strips from said data to a chosen disk of said plurality of disk drives; forming a data stream comprising said data strips, said data stream having a first throughput; creating a plurality of parallel data streams, each of said plurality of parallel data streams having a second throughput, said second throughput being smaller than said first throughput; directing said plurality of parallel data streams to a corresponding plurality of said plurality of disk drives such that each data strip in said plurality of data strips is transmitted to said chosen disk of said plurality of disk drives;" (emphasis added by applicant), with similar recitations for independent claims 9 and 14. Thus, the present claimed invention is directed to aggregating the bandwidth of multiple, lower-speed storage devices to permit higher speed data transfer from devices capable thereof, and vice versa.

By contrast, Riggle teaches bandwidth matching. As an example, the Abstract of Riggle states in part: "... The storage subsystem divides the transfer unit into a number of stripes of a pre-determined size. Each stripe is allocated to a separate disk drive whose disk surfaces are formatted into a number of track bands. Each track band is composed of several contiguous tracks associated with the same data transfer rate. Each stripe is then stored on its disk drive within a selected track band. **Both data storage and retrieval from each disk drive occur at the data transfer rate associated with the accessed track band.** Since all the stripes in the transfer unit are transferred to their disk drives simultaneously, the transfer operation occurs at an aggregate transfer rate equal to the sum of the individual track band transfer rates. The storage subsystem selects the track bands on each disk drive in such a manner as to ensure that the data transfer operation occurs at an aggregate transfer rate **within a pre-determined bandwidth range** of the communication channel bandwidth." Further, Col. 5, lines 5-34 of Riggle states: "With all disk drives transferring data simultaneously the effective bandwidth of the disk array is the sum of the individual bandwidths of the disk drives and their controller interfaces. ... To provide the bandwidth increase in an economically feasible manner the

subsystem resources must be used at their optimum capacity levels. If the storage system bandwidth is configured to accommodate the highest transfer rate, the bandwidth capacity is underutilized on average because for full storage capacity utilization data must be placed on all available tracks on the disk surface. Hence a sufficiently large sample transfer unit will span a range of track bands from the disk drives involved." And, in Col. 4, lines 60-67 it is stated that: "However, since the linear velocity of a track in an outer track band is greater than that of an inner band track, for the same aerial density on either track the number of data bits per second that must be transferred by the read/write transducer increases <u>requiring a higher read/write channel bandwidth for outer track data transfers compared to the slower inner track bands</u>."

Clearly, Riggle teaches that the input data is divided into a number of stripes of pre-determined size, the storage subsystem selects the track bands on each disk drive in such a manner as to ensure that the data transfer operation occurs at an aggregate transfer rate within a pre-determined bandwidth range of the communication channel bandwidth. However, since different track bands have different transfer rates and the storage subsystem of Riggle selects the track bands such that the data transfer operation occurs at an aggregate transfer rate within a pre-determined bandwidth range, each of said plurality of parallel data streams is not required to have a second throughput equal to that of another data stream, as is required by subject independent claims 1, 9 and 14. Therefore, applicant respectfully believes that the Riggle reference does not anticipate the independent claims of the present claimed invention. Since subject independent claims 1, 9, and 14 are not anticipated by Riggle, applicant believes that dependent claims 2-8, 10-13 and 15-18 which depend therefrom, respectively, are similarly not anticipated by Riggle.

In view of the discussion presented hereinabove, applicant believes that subject claims 1-18, as amended, are in condition for allowance which action by the Examiner at an early date is earnestly solicited.

Reexamination and reconsideration are respectfully requested.

Respectfully submitted,

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